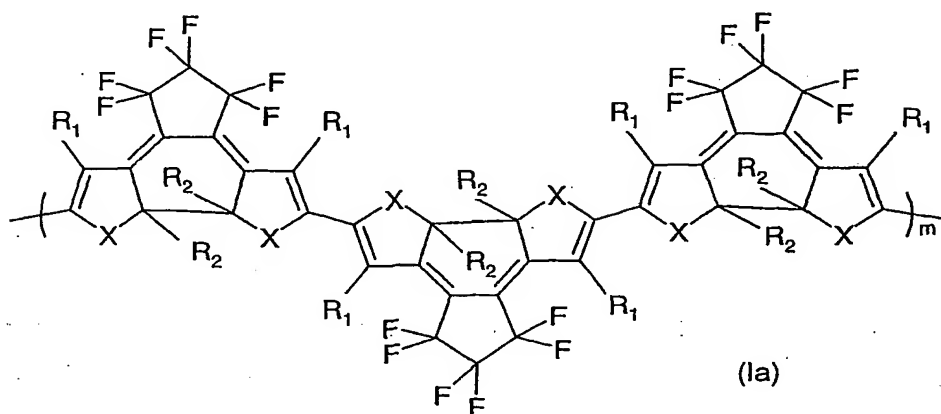


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CLAIMS

- 1) An optical waveguide comprising a matrix and an optical path including a photochromic diarylethene polymer having the general formula (Ia)



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wherein

X is S, O, Se, Te, or N-R, wherein R is hydrogen or a linear or branched (C₁₋₁₂)alkyl group;

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R₁ is hydrogen, a linear or branched (C₁₋₁₂)alkyl or (C₁₋₁₂)alkoxy group;

R₂ is a linear or branched (C₁₋₁₂)alkyl group; and

m = 4-100.

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- 2) An optical waveguide according to claim 1 wherein X is S, Se or Te.

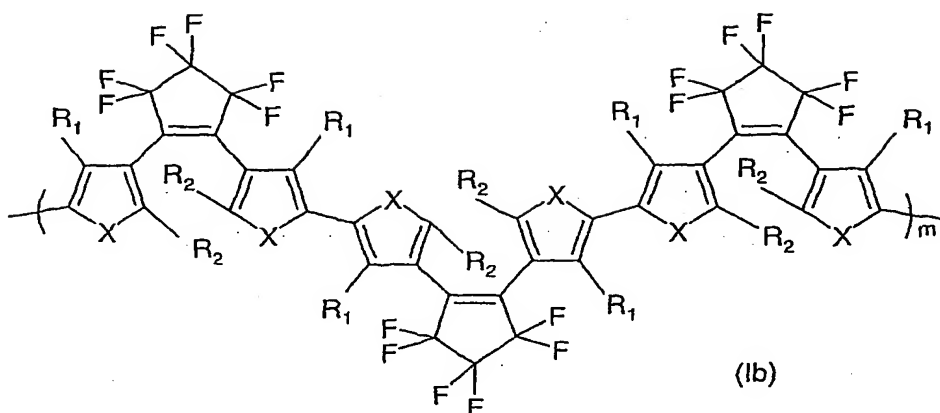
- 3) An optical waveguide according to claim 2 wherein X is S.

- 4) An optical waveguide according to claim 1 wherein R₁ is hydrogen or a (C₁₋₃)alkyl group.

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- 5) An optical waveguide according to claim 1 wherein the optical path is surrounded by a matrix comprising a photochromic diarylethene polymer having the general formula (Ib)

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wherein X, R₁, R₂ and m are according to any of the preceding claims.

- 6) An optical waveguide according to claim 1 wherein said photochromic diarylethene polymer is dispersed in said matrix.
- 7) An optical waveguide according to claim 1 wherein said matrix is selected from polystyrene, polymethylmethacrylate (PMMA), polycarbonate, polysulphone, polyimide, fluorinated or deuterated PMMA, and mixtures thereof.
- 8) Method for the preparation of an optical waveguide comprising the steps of
 - a) dissolving a photochromic diarylethene polymer of formula (Ib) as from the preceding claims, in an organic solvent;
 - b) mixing the thus obtained solution and a polymeric matrix until a dispersion is obtained;
 - c) preparing a film by depositing said dispersion on a substrate;
 - d) irradiating said film, so as to form an optical path comprising a photochromic diarylethene polymer of formula (Ia) as from the preceding claims.
- 9) Method according to claim 8 wherein the organic solvent is a chlorinated solvent.
- 10) Method according to claim 8 wherein the photochromic diarylethene polymer of the invention is dissolved in said matrix at a con-

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centration not higher than 20% by weight.

11) Method according to claim 10 wherein said concentration ranges between 0.1% and 15% by weight.

5 12) Method according to claim 11 wherein the concentration ranges between about 5 and about 10% by weight.